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INSTITUTIONALIZATION OF INSTRUCTIONAL SYSTEM DEVELOPMEN (ISD) IN THE NAVAL EDUCATION AND TRAINING COMMAND: AN ORGANIZATIONAL ANALYSIS

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MAY 1979

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INSTITUTIONALIZATION OF INSTRUCTIONAL SYSTEM DEVELOPMENT (ISD)
IN THE NAVAL EDUCATION AND TRAINING COMMAND:
AN ORGANIZATIONAL ANALYSIS

Gary W. Hodak
Morris G. Middleton
William C. Rankin

Training Analysis and Evaluation Group
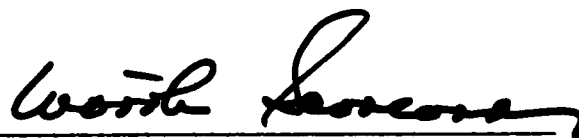
May 1979

ALFRED F. SMODE, Ph.D., Director,   WORTH SCANLAND, Ph.D.
Training Analysis and Evaluation Group   Assistant Chief of Staff
                                           Research and Program Development
                                           Chief of Naval Education and Training

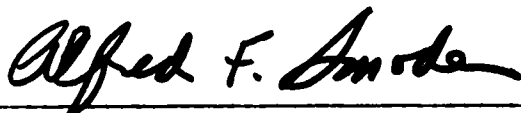| REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
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Instructional Program Development

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Instructional systems development (ISD) is the broad application of the systems approach to training. This report documents a study of the Instructional Program Development Center(s) (IPDC) as an approach to ISD in the Naval Education and Training Command (NAVEDTRACOM). The concept of ISD was not an issue; rather, the Navy's institutionalization of ISD was the principal concern of the study. The study is based on inherently non-objective data; i.e., interviews, documentation, opinions of involved

20. ABSTRACT (continued)

personnel. The views expressed in this report should not be construed
to be an official position of the NAVEDTRACOM.

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SECTION I

INTRODUCTION

This report documents a study of the Instructional Program Development Center (IPDC) approach to Instructional Systems Development (ISD) in the Naval Education and Training Command (NAVEDTRACOM). The Training Analysis and Evaluation Group (TAEG) was tasked by the Chief of Naval Education and Training (CNET), Code N-5, to evaluate and make recommendations concerning the Navy's ISD implementation effort (CNET NOTICE 1500 of 12 May 1978). The concept of ISD was not an issue; rather, the Navy's institutionalization of ISD was the principal concern of the study.

PURPOSE

The purpose of this study is to:

• Describe the ISD implementation effort from an organizational perspective

• Evaluate the organizational aspects of the ISD implementation

• Identify areas needing improvement and make recommendations for improvement of the organization for ISD

• Explore options for future ISD implementation.

BACKGROUND

Instructional Systems Development is a deliberate and orderly process for planning and developing instructional programs which insure that personnel are taught the knowledges, skills, and attitudes essential for successful job performance. As a concept and practice, it has evolved since World War II. During this time, in a variety of forms, ISD has been applied to both military and industrial training problems. The CNET has recently adopted ISD as the preferred/primary approach to the design, redesign, development, and maintenance of many courses of Navy instruction. One of the 10 primary objectives by the newly formed NAVEDTRACOM in 1973 was the development of courses via the ISD concept. Decision Memorandum for Record No. 1, 12 December 1974, established the concept of centralized management of ISD, and the issuing 1 August 1975 of NAVEDTRA 106A established the procedures to be followed by the Navy in ISD. Decision Memorandum for Record No. 2 of 27 April 1976 established Instructional Program Development Centers (IPDCs) at San Diego, California, and Great Lakes, Illinois. Decision Memorandum for Record No. 2 (revised) of 20 January 1977 set forth the order by which the "A" schools' instructional programs would be restructured.

It is currently planned to establish additional IPDCs at Memphis, Tennessee; Pensacola, Florida; and Norfolk, Virginia. To aid in the execution of the plan, it is desired to determine how ISD was implemented and if sufficient experience exists to improve the implementation of the ISD concept in Navy training. The key chronological events in the institutionalization of ISD in the NAVEDTRACOM

are shown in table 1. The table provides a listing of the most important or influential events. The majority of these items will be discussed in later sections of this report.

APPROACH

The basic approach taken in this study was to perform an organizational analysis of how ISD was implemented in NAVEDTRACOM. Conducting this study required access to information concerning communications, guidance, policy, planning, personnel problems, organizational structure, operating procedures, and other factors involved in establishing the IPDCs. This information was acquired through (1) analysis of published guidance and policy documents, (2) visits to the involved commands, (3) interviews with key personnel, and (4) analysis of internal reporting documents and systems (i.e., situation summaries, letters, memorandums for the record). The study relied heavily on direct discussions with the individuals involved in implementing ISD and thus is based on inherently nonobjective data (i.e., interviews, documentation, opinions of involved personnel).

A basic model conceptualizing the ISD implementation process was developed to aid in the analysis of the program. This model is presented in figure 1. Three areas to be evaluated are apparent from this model. They are organizational efficiency, quality of output, and usage of the ISD model by the IPDCs. This study concentrated on the organizational aspect of implementing ISD in NAVEDTRACOM.

ORGANIZATION OF THE REPORT

In addition to this introduction, the report contains three other sections. Section II describes the implementation effort of the IPDCs and contains an evaluation and discussion of selected features of the organizational approach to implementing ISD in the NAVEDTRACOM. Alternatives for improving IPDC productivity/ efficiency and options for future directions are contained in section III. Section IV describes some of the achievements in the implementation of ISD and describes recent changes at the IPDC San Diego. The reference list contains the CNET and CNET SUPPORT instructions and guidance documents considered essential to the implementation of ISD in the NAVEDTRACOM as well as key Naval Education and Training Support Center, Pacific (NETSCPAC) memorandums. Appendix A contains excerpts outlining benefits and an overview of the ISD process.

TABLE 1. KEY CHRONOLOGICAL EVENTS

Date	Event
11 Mar 74	CNET statement of policy and doctrine for the centralized control and management of instructional program development (CNETINST 1550.5).
12 Dec 74	CNET approved and announced the orderly transfer of responsibility for the management of instructional systems development to the Chief of Naval Education and Training Support (CNET SUPPORT) (CNET Decision Memorandum for Record No. 1).
6 Jan 75	Organized the ISD Study Group and directed that a concept of operations for implementing centralized management of ISD be developed (CNET SUPPORT 00 memo of 6 Jan 75).
1 Aug 75	The Interservice Procedures for Instructional Systems Development Executive Summary and Model was issued as NAVEDTRA 106A.
11 Aug 75	The Plan, the "Blue Book," for the centralized management of ISD within the NAVEDTRACOM was completed by the ISD Study Group at CNET SUPPORT and submitted for approval and transmittal to the CNET (Memo for CNET SUPPORT 11 Aug 1975).
15 Sep 75	CNET approved the "Blue Book" plan in concept and principle and directed its implementation (Briefing of the CNET on 15 Sep 1975).
31 Dec 75	CNET assigns responsibility for Instructional Program Development, as described in the "Blue Book" plan, to the CNET SUPPORT (CNET ltr, Code N-5, of 31 Dec 1975).
8 Mar 76	CNET policy and guidance for the establishment of the Career Training Analysis Group (CTAG) and the conduct of Front End Analysis (FEA) as it pertains to ISD (CNET memo for CNET SUPPORT of 8 Mar 1976).
27 Apr 76	Announced, CNET decisions to: 1. Establish initial IPDCs at San Diego as a department of NETSCPAC on 1 Jul 1976 and the second IPDC at Great Lakes on 1 Jan 1977. 2. Provide centrally contolled fiscal resources during FY 76 and FY 7T. 3. Integrate CMI with the plans for the redesign of courses by IPDCs (CNET Decision Memorandum for Record No.2).
16 Jun 76	CNET specifies the responsibilities of the CTAG and the IPDCs in carrying out the functions required by the "Blue Book" and Decision Memorandum No. 2 (CNET Memorandum of Understanding of 16 Jun 1976).

TABLE 1.   KEY CHRONOLOGICAL EVENTS (continued)

Date	Events
1 Jul 76	IPDC San Diego established in accordance with CNET Decision Memorandum No. 2.
19 Jan 78	CNET SUPPORT policies and guidance for the IPDCs was promulgated in CNETSINST 1550.6.
20 Jan 78	Decision Memorandum No. 2 was updated by CNET to reflect the latest situation; e.g., (1) IPDC was established in San Diego, (2) the second IPDC was established on 1 Jan 77 at Great Lakes, and (3) provided the order for instructional program restructure at IPDC Great Lakes (Decision Memorandum for Record No. 2 (revised)).
1 Mar 78	Critique of the RM - A School pilot course at IPDC San Diego 1-3 Mar 78 (CNET msg 301738Z Dec 77).
28 Jul 78	Alternatives for Implementation of the IPDC "Blue Book" plans. (CNET Memorandum for the Record).
1 Sep 78 (Approx)	CNET SUPPORT reorganizes IPDC San Diego.

QUALITY OF OUTPUT
(ACCURACY/VALIDITY)

CNET   IPD

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USAGE/FIDELITY OF ISD MODEL

◄——— ORGANIZATIONAL EFFICIENCY ———►
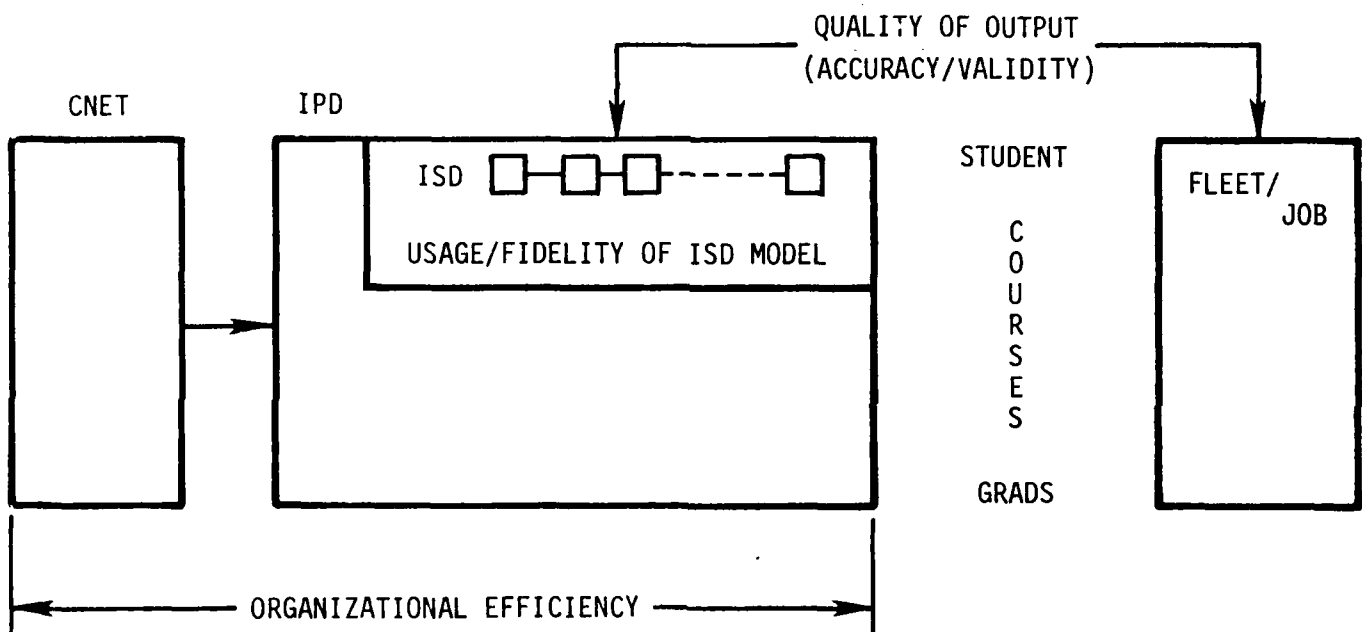
EVALUATION AREAS:

    ORGANIZATIONAL EFFICIENCY
    QUALITY OF OUTPUT (ACCURACY/VALIDITY)
    USAGE/FIDELITY OF ISD MODEL

Figure 1. Conceptualization of ISD/IPD Elements to be Evaluated

9/10

TRAINING AND RETRAINING (TART) OF THE IPDC PERSONNEL

In order to compensate for errors encountered in personnel selection, which resulted in the overall professional skills deficiency, an attempt was made to train and retrain these personnel. The need for training in the ISD (NAVEDTRA 106A) methodology was recognized by CNET and CNET SUPPORT but seriously underestimated. With virtually none of the personnel selected having direct or, relevant experience, the need was obvious. Even if experienced personnel had been recruited, some training would have been desirable to ensure agreement on terminology and consistency in working practices and "to do it the Navy way."

The TART approach to this training requirement began with a small cadre (approximately 10 staff members) from CNET SUPPORT attending a 4-week course on ISD conducted by the NAVEDTRA 106A developers at Florida State University. A discussion between the TAEG team and the NAVEDTRA 106A developers revealed that the purpose of this course was not to produce competence in ISD. Rather, the course was intended to familiarize "middle managers" of ISD activities. All NETSCPAC personnel assigned to IPDC during March-July 1976 received a TART program that was 4 weeks in length. Subsequently, the course length was reduced to 3 weeks, then 2 weeks, and finally to 1 week. Courses of this length are not sufficient to train personnel in the process of ISD. Yet the reduction of TART to 1 week was viewed as a significant accomplishment by management. This failure to recognize the need for adequate training of personnel resulted in significant inefficiencies and waste of resources at both IPDCs. Currently on the job training (OJT) is the primary method of training, yet it is not formalized. OJT should only be used as a supplement to formal training to acquire basic competencies in instructional technology.

AN EVALUATION OF NAVEDTRA 106A

The NAVEDTRA 106A manual, Interservice Procedures for Instructional Systems Development (IPISD), is a description of the approved techniques and procedures to be followed in the development and conduct of interservice training. The Center for Educational Technology at Florida State University developed the manual under contract to the U.S. Army Combat Arms Training Board, Fort Benning, Georgia. The Interservice Training Review Organization (ITRO) became the approving authority shortly after the project commenced. This change in approving authority broadened the project's scope to include requirements from the Air Force, Marines, Army, and Navy.

NAVEDTRA 106A was not designed to provide specific procedures for every instructional situation that could be encountered. Consequently, it was neither intended nor could it function as an implementation tool. The manual has no provisions for addressing the logistics or facilities problems associated with its utilization. There are no procedures described to ensure that the funds for long lead time items; i.e., simulators, training devices, media, are reserved far enough in advance in the budget cycle so the money/equipment will be available at the appropriate time in the instructional material development cycle. No guidance is provided in the manual for utilizing contractor support in ISD. Nor does it provide guidance in the administrative support area.

The concept of ISD has many proponents and opponents. By some, the concept

The guidance and direction given to the IPDCs from CNET SUPPORT have been primarily via direct communication (telephone calls, personal visits, and letters) rather than through a plethora of instructions and notices. The instructions that have been issued are listed in the references. Of the nine instructions that have been issued, only one (CNETSUPPORTINST 1550.6 of 19 Jan 1978) concerns policies and guidance. The others concern the mission and functions of the controlling organization, man-hour accounting, and management information and reporting system. As with the CNET instruction, CNETSUPPORTINST 1550.6 was issued very late; i.e., more than 19 months after IPDC San Diego was established. This instruction provides guidance but is also very restrictive in that all modules/lessons, curriculum outlines, selection of media, instructional material, description documents, and equipment requirements must be forwarded from IPDCs to CNET SUPPORT for approval. Not only is this procedure very time consuming but as increased productivity is achieved by each IPDC, additional workload will be generated for CNET SUPPORT personnel. It is doubtful that the technical expertise in such a broad area (all "A" schools in the Navy) is available on the CNET SUPPORT staff to make the required technical decisions. A set of standard operating procedures providing for IPD site autonomy yet maintaining the reporting of information required for proper management of each IPDC needs to be developed.

STAFFING OF THE IPDC SAN DIEGO

The staffing of any organization requires considerable time, effort, and experience to properly match the position requirements to personnel skills. A person misplaced or improperly assigned often creates a variety of organizational inefficiencies. The IPDC San Diego was staffed by transferring personnel from within the NETSCPAC organization, the CNET headquarters organization, the dis-established Individualized Learning Development Group (ILDG), and other Navy activities, and hiring a limited number of outside personnel, none of whom had experience in either the ISD process or the management of an organization responsible for performing ISD in the Navy setting. Not only did the personnel lack experience but they had no formal training in ISD, which resulted in immediate productivity problems of false starts, morale, misassignment, and a necessity for providing in-house training with minimally qualified instructors.

Numerous problems were encountered by management personnel in attempting to hire qualified personnel from outside the Navy because the Civil Service Commission (CSC) does not distinguish among the various categories of education specialist. Managers were frustrated in selecting qualified personnel from the Civil Service Register by CSC procedures. In addition, a hiring freeze was imposed for all positions during the period January to April 1977. The combination of these circumstances prevented the completion of the staffing of the IPDC San Diego until October 1977, some 15 months after the IPDC was established.

Approximately 60 percent of the personnel finally selected are classified as education specialists. Unfortunately, too many of these personnel are not trained in behavioral analysis, psychometric assessment, and technical writing capabilities; i.e., those skills closely associated with ISD tasks.

Unlike the departmental structure of IPDC San Diego, IPDC Great Lakes utilizes the team concept. Although the organization structure is streamlined for productivity, it is dependent upon the front-end analysis conducted by the NETSCPAC N-8 department and is remotely governed by the Naval Education and Training Program Development Center (NAVEDTRAPRODEVCEN). Being approximately one-fourth the size of IPDC San Diego and being able to profit from the experience of IPDC San Diego, relatively few problems have been encountered by IPDC Great Lakes. Those problems which are encountered are common to both sites; i.e., SME service and proper timing of resources. IPDC Great Lakes has been fortunate in acquiring personnel. Not only do they have staff members that were trained at IPDC San Diego but they were able to hire educational specialists and highly trained educational technicians from the local community. In addition, the initial tasking for development of the course for the fireman apprentice (FA) rating was constrained (i.e., course objectives were given by sponsor), thus no front-end analysis was undertaken by necessity. Excellent working relationships were developed with the school (FA) and fleet. Personnel working on other assigned tasks have, likewise, enjoyed excellent working relationships with the schools for which curricula are being developed.

Because the CTAG of IPDC San Diego conducts the majority of the front-end analysis for IPDC Great Lakes, the problem of SME availability has not impacted the programs of IPDC Great Lakes to the degree experienced at IPDC San Diego. To date, all ratings assigned for course development have schools in proximity to the IPDC and have SMEs available to assist project team personnel. The IPDC personnel have been allocated working space in the schools which enhances the opportunity to acquire SME assistance. Although much progress has been made at IPDC Great Lakes in securing the services of SMEs, some problems still exist in the timeliness of SME availability.

The internal communication network at IPDC Great Lakes is excellent. Contributing factors are: relatively small organization, team concept, and overall organizational structure. External communication is also very good with the schools and fleet. The weak link in the communication system is among NAVEDTRAPRODEVCEN, IPDC Great Lakes, and CNET SUPPORT. The NAVEDTRAPRODEVCEN and CNET SUPPORT are located at Ellyson Field in Pensacola, Florida. To communicate with CNET SUPPORT, IPDC Great Lakes must go via NAVEDTRAPRODEVCEN and vice versa.

IMPACT OF GUIDANCE AND DIRECTIONS ON THE IPDCs

Official guidance and directions given to subordinate commands or activities are most often promulgated in the form of instructions, directives, or notices. A review of these documents reveals that CNET has issued six documents concerning ISD and the IPDCs. Four of these documents were issued prior to the establishment of the first IPDC in July 1976 and were not applicable to the organization and operation of an IPDC. Of the two instructions issued since July 1976, one gives guidance for validation standards for IPD and the other, CNETINST 1550.13, defines the authority and responsibility of CNET SUPPORT for revision and development of those programs assigned by CNET to the IPDCs. The issue date of this instruction was 7 September 1977, over 14 months after the IPDC was established at San Diego. A revision to this instruction was issued 25 July 1978 which identifies the responsibilities of various CNET functional commanders concerning ISD. No additional instructions, directives, or notices have been issued to date.

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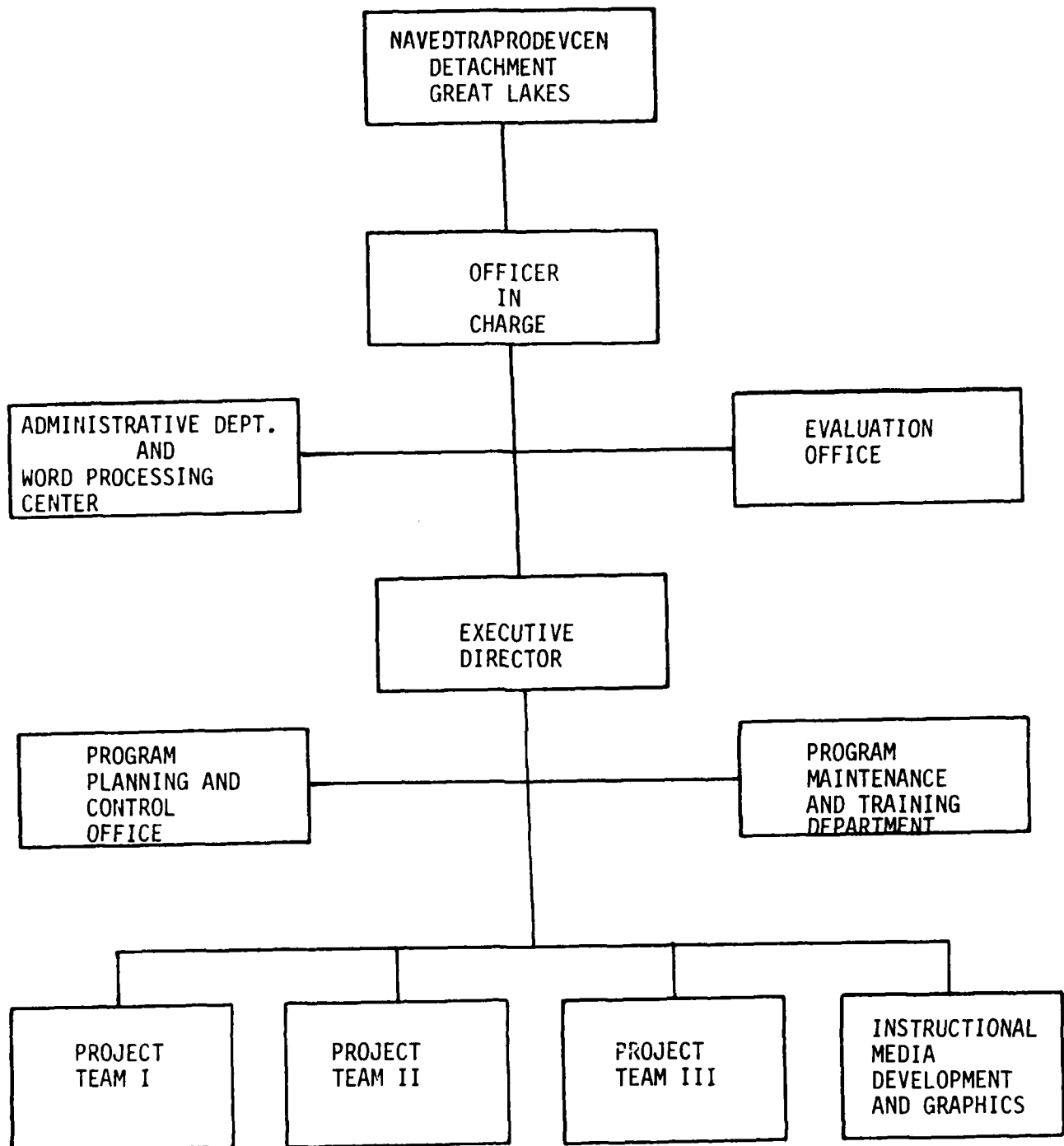
Figure 6. Great Lakes IPDC Organization Structure

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Recognizing these deficiencies, NETSCPAC management began an in-house development program to indoctrinate all personnel. Working within existing resources, a training program was developed to introduce personnel to the ISD concept.

An additional problem encountered by the IPDC was obtaining the services of SMEs. The control of SMEs is a function of the CNTECHTRA. The scheduling of the SMEs to the IPDCs is difficult since the time devoted to IPDCs must be taken away from their primary function as instructors/administrators in the schools. Not only is scheduling a problem but the method by which SMEs are obtained also adds to the overall problem. IPDC must request SME support from CNET SUPPORT who in turn must request CNET to task CNTECHTRA to provide SMEs. This adds to the delay of obtaining SMEs in a timely fashion. The nonavailability of SMEs has adversely affected every program (RM-A, IC, etc.) to date and no relief in this area is foreseen for the near future. Because of the short duration an SME is available to the IPDC, minimal continuity from one phase of the ISD process to another is possible, result-ing in little SME support in the design and development phase as well as later phases of the process.

In theory, the organization's communication network follows the chain of command. In prac're the actual network is difficult to identify. During day-to-day operations, first line supervisors of IPDC discuss topics/problems with CNET SUPPORT (highc r headquarters) personnel. The same topic/problem is later discussed with the same CNET SUPPORT personnel by higher level IPDC/NETSCPAC managers. This redundant communication system often results in incorrect or conflicting information being given and received. The internal communication network among the three departments of IPDC is not considered effective since the Task Analysis Department receives assignments directly from CNET while the other two divisions receive their assignments from CNET via CNET SUPPORT and NETSCPAC. This dual management not only causes each department to establish different criteria for milestone development effort and resources to be applied, but also affects the morale and esprit de corps of divisions. However, internal division communication networks are excellent. Communication between IPDC and the schools is adequate. Communications between IPDC/CNET SUPPORT/CNET and the warfare sponsor is not adequate, as was exemplified during the "RM-A" critique of March 1978. The sponsor and the fleet representatives for this program had not been "kept current" with the activities and decisions that had been made during the curriculum development of the RM-A.

Much responsibility has been placed on the IPDC, yet the authority commen-surate with this responsibility has not been given. The approval for many items, some very minor, is reserved for CNET SUPPORT. CNET SUPPORT Instruction 1550.6 requires the IPDCs to submit for review and approval items for which CNET SUPPORT does not possess the expertise nor time to properly review (i.e., audio-visual, CMI, General Purpose Electronic Test Equipment, material to be developed under contract). Not only is this process time consuming but it delays the orderly process of production.

ORGANIZATION OF THE IPDC GREAT LAKES

The organization structure of IPDC Great Lakes is shown in figure 6.

The second approach is consistent with the view of an ISD product being custom made, one-of-a-kind. In this approach a project team is assigned from a skilled human resource pool or from a matrix of professional disciplines to carry out all of the steps and decision making of the ISD process. Choosing this structural alternative implies a trade off between the advantage of smooth flowing continuity of effort and the problem of finding personnel who are well versed in all the facets of educational technology (ISD).

Certainly some feasible hybrid combinations of these two basic approaches are possible; however, for the purpose of this evaluation, these two approaches are considered as referents for comparison with the actual organizational structure chosen to implement ISD at the two original IPDC sites. Unfortunately, there is no clearly advantageous approach without some experience gained from an organizational tryout.

The San Diego IPDC site was originally organized departmentally along functional lines. This was done, in part, to minimize the internal personnel disruption of NETSCPAC. The Great Lakes IPDC site originally employed the project team approach.

ORGANIZATION OF THE IPDC SAN DIEGO

The organization structure of IPDC San Diego from its inception until October 1978 is presented in figure 4 (enclosed in broken lines). At the time the IPDC was established and under the constraints imposed (i.e., within existing resources and by reduction in force action), this structure was a viable alternative and should have proven workable if the ISD models were followed by "the numbers." However, additional management constraints (i.e., complete rating front-end analysis, one department conducting all front-end analysis for both sites, separation of front-end analysis from design and development) contributed significantly to the problems encountered during the first 2 years of operation.

Several problems in the organization of IPDC are noteworthy. First and foremost, each department operates as an independent unit with equal status in NETSCPAC management structure. There was no centralized responsibility for the entire project, yet each department was ultimately responsible for a portion of the ISD concept. To compound this problem, the Task Analysis Department, N-8 (CTAG), received its direction from CNET (N-5) who in command structure is two echelons above NETSCPAC.

The initial staffing of the organization was suboptimal. Due to external (higher headquarters) pressure to "get on with the program," personnel who were technically qualified but inexperienced in ISD were assigned from within NETSCPAC to IPDC. Similar personnel were obtained via reduction in force actions from the Naval Instructional Technology Development Center (NITDC), schools, and other segments of CNET that were affected by the decision to apply the ISD concept to "A" school curricula. It is understandable that these personnel could not form the core of an immediately productive organization. Efforts were made by management personnel to augment the above staff via Civil Service Commission (CSC) procedures. However, despite conscientious efforts "the system" hindered the identification of personnel with the specialized skills required for the implementation of the ISD concept in the Navy.

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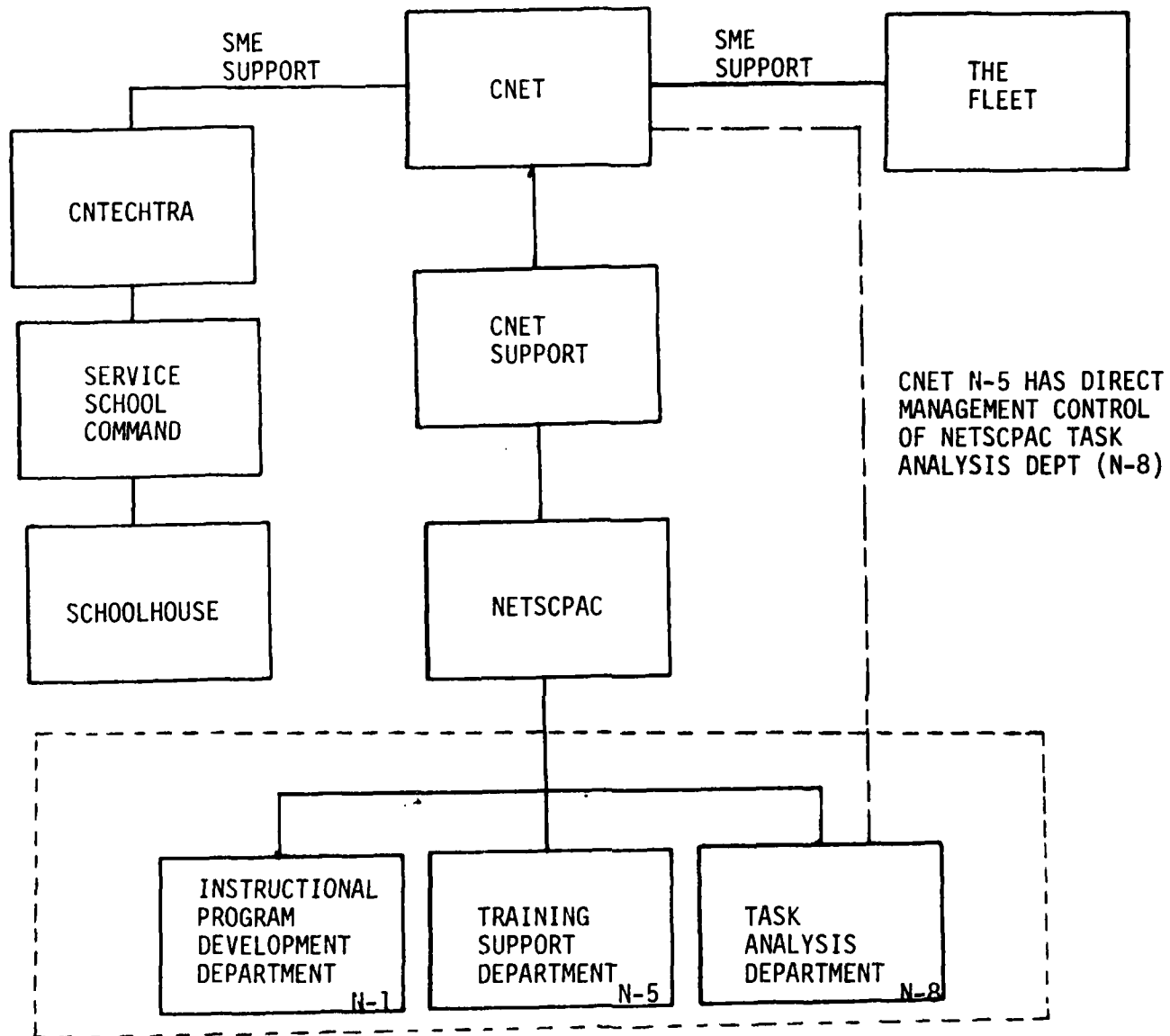
Figure 5. Overall ISD Management Organization
(Excluding Great Lakes IPDC)

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                    │    NETSCPAC     │
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Figure 4.   NETSCPAC Organization for Management of
              Instructional Systems Development

would undergo the ISD process were scheduled via this memorandum. Figure 4 depicts the NETSCPAC organization alignment established to carry out the assigned task commencing 1 July 1976. Prior to the issuing of Decision Memorandum for the Record No. 2, a conference was held (13 February 1976) between members of the CNET SUPPORT N-5 and CNET N-5 staffs to establish a group to perform the function of "front-end analysis." The agreements reached during this conference gave CNET N-5 management control of the Career Training Analysis Group (CTAG), as well as the responsibility for establishing policy, procedures, standards, priorities, and evaluation of the front-end analysis of the CTAG. Upon the establishment of IPDC San Diego, the CTAG was transferred (billets and functions) to San Diego and became the Task Analysis Department (Code N-8) of NETSCPAC with the responsibilities and functions identified above. Although the function was transferred to NETSCPAC, the control of CTAG was retained by CNET.

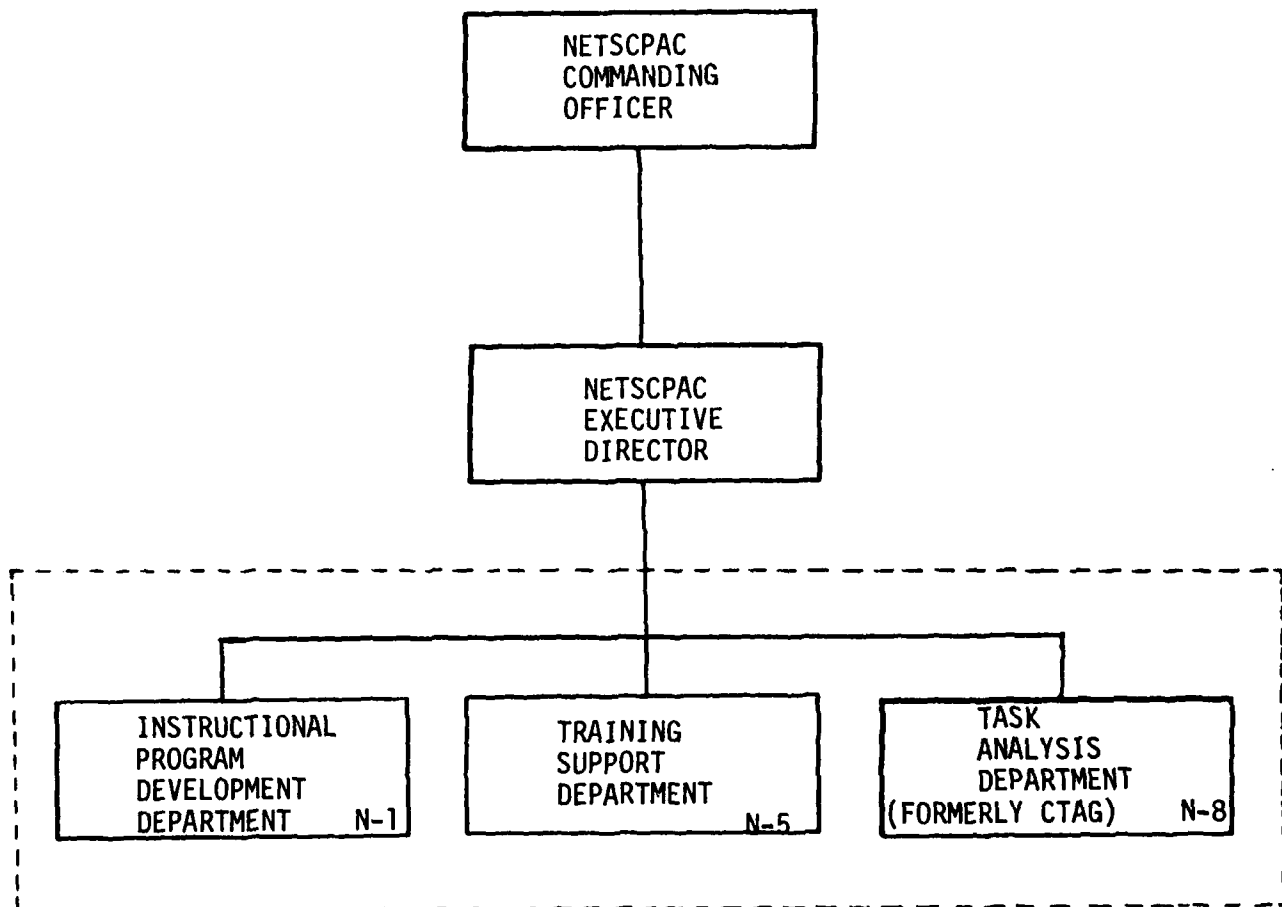Figure 5 presents the overall management structure as of 1 July 1976. Two additional organizations are included for completeness. The Chief of Naval Technical Training (CNTECHTRA) organization is included because of the considerable interaction required among the schoolhouse, training program coordinators (TPCs), and IPDC for technical support, SME support, and access to the schoolhouse. The fleet was included since they were to be a source of SME support and the ultimate user of the product of training (the students).

IPDC WORK PROCESS

In establishing an organizational structure it is necessary to consider the nature of the work to be performed; e.g., repetitious assembly line work, "one-of-a-kind" custom projects, sales. The usual guidelines on which modern organizations are based require such considerations as span of control, central vs. decentralized communication and control, and the grouping of personnel by similar type to perform similar functions. The latter consideration, while a matter of job design and description, most often impacts on the resulting organizational structure since the job should be the basic unit or building block upon which the organization is built.

The work to be done in ISD is shown graphically in NAVEDTRA 106A as a sequential process. The major functions of this process for which IPDCs are responsible consist of "Analyze," "Design," and "Develop." These functions are obviously sequentially dependent. However, some of the activities and decisions within these functions occur in parallel. Some aspects of the ISD process are somewhat "assembly line" in nature, yet the final output (a revised "A" school course) is a "one-of-a-kind" custom project.

Given the nature of the work required by ISD, two approaches to organizing the work effort appear feasible. One approach, consonant with the "assembly line" view of ISD, entails specialization and departmentalization of personnel. In this approach, a designated set of personnel or a department performs one ISD function or subfunction exclusively, passing its product to another functionally dedicated department, and so on until the final product emerges. Choosing this structural alternative implies that a trade-off analysis has been made between the advantages of specialization and the problems encountered in interdepartmental communication/coordination/cooperation.
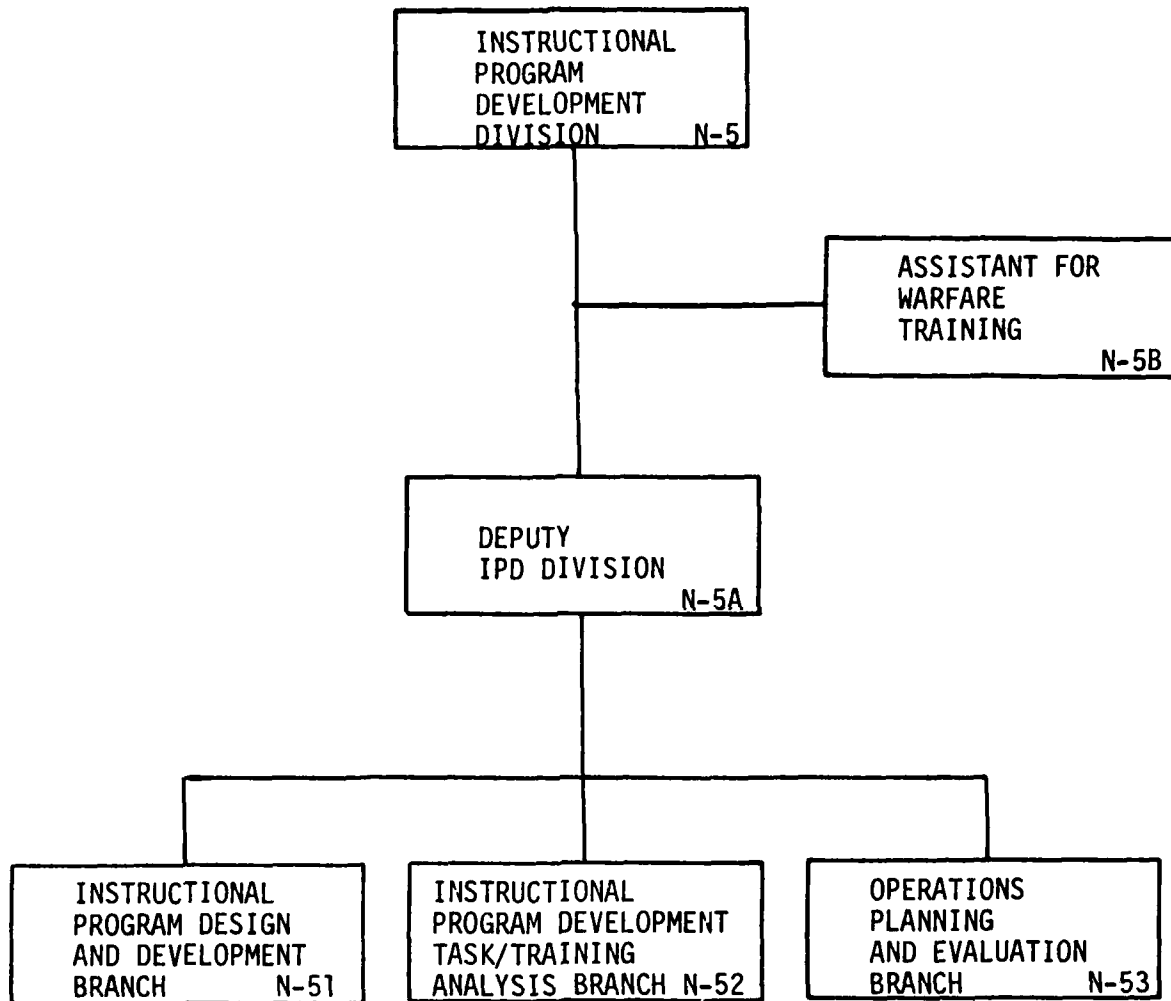
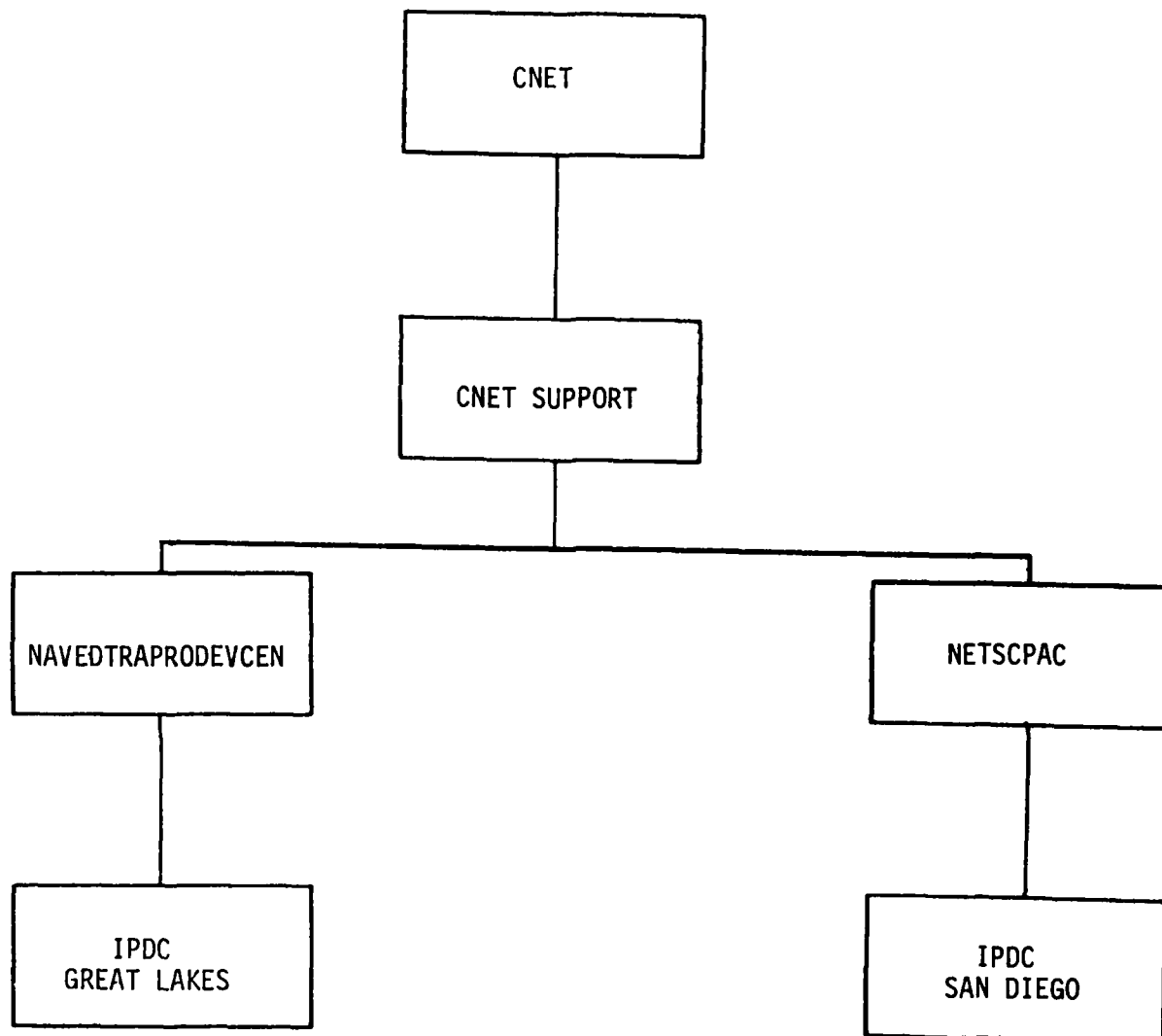Figure 3. CNET SUPPORT Organization for Instructional Systems Development

Figure 2. CNET ISD Management Organization

charged with managing ISD fully understood or appreciated the magnitude of the task they were undertaking.

The failure to accurately estimate the magnitude of effort required for implementation and a lack of recognition of potential obstacles to a major change in the methodology of producing "A" school curriculum without an executable plan and a "trial run" were management miscalculations. Other shortcomings were: (1) the initial estimate of producing 1,000 hours of instruction material per year per site, based upon fully trained personnel (technologists and management) being available, (2) establishing a deadline for completion of the first course (RM-A), and (3) not revising the schedule in view of all the obstacles to implementation that took place during the first 12 months of operation (i.e., hiring freezes, unavailability of trained personnel, lack of adequate funds, changes, and insufficient guidance).

The functions performed by industry in the ISD process are similar to those performed by the military (i.e., analysis, design and development, and production of curriculum). It is inconceivable that the government would award a contract to an industrial organization that was in the process of organizing a business, had untrained personnel, was dependent upon another organization for raw materials, and had a constrained production schedule for developing an end-product by a process which had never been tried. Yet, this is the situation (newly organized, untrained personnel, etc.) that was faced by IPDC San Diego.

Developing a new course, or even revising old course material utilizing new techniques (ISD), is a formidable undertaking. Application of the ISD methodology for course development requires an experienced, well-trained team of instructional technologists and SMEs. It also requires the total support of top management, sponsors, the school, and the fleet, plus an adequate amount of time and resources. Throughout the NAVEDTRACOM ISD program, some of these key elements have been frequently absent.

ORGANIZATIONAL STRUCTURE

CNET instructions 1550.5 of 11 March 1974 and 1550.13A of 25 July 1978 and Decision Memorandums No. 1, 2, and 2 (revised) established the policies and procedures for the organizational structure required to carry out the ISD concept. Decision Memorandum No. 1 gave the responsibility for the management of ISD to CNET SUPPORT. The original overall management/control organization for implementation of ISD is shown in figure 2 and was predicated on the time phased establishment of the IPDCs in both San Diego and Great Lakes. In order to carry out the tasks associated with centralized management of ISD, CNET SUPPORT formed the Instructional Program Development Division (Code N-5). This division is responsible for the initiation, planning, coordination, and control of all ISD functions and tasks. It is also responsible for resource requirements associated with the analysis, design, and development of instructional programs and support material for centrally managed Instructional Program Development. Figure 3 depicts this division at the time (July 1976) of initial implementation.

Decision Memorandum for the Record No. 2 of April 1976 announced that the initial IPDC would be established at San Diego as a department of NETSCPAC on 1 July 1976. The establishment of other IPDCs and the sequence of ratings that

use in all department. were useful and supplied local managers with required information upon which to make operational decisions. However, operational decisions have been and continue to be hampered by the absence of a master plan. Of paramount importance is the development of a plan (or direction) that will allow a shift of emphasis from one CNET assigned task to another when the need arises.

Profiting from the experiences at IPDC San Diego, the IPDC at Great Lakes has encountered few problems in developing plans for local operation. Unlike the departmental development of a plan by IPDC San Diego, the execution of each assigned task at IPDC Great Lakes is planned by the team designated to complete the task. All plans are developed in concert with management personnel, whereby all major factors are taken into consideration. However, operational problems are encountered (i.e., long lead items, personnel availability, engineering facility support) due to the absence of an overall long range plan.

Chief of Naval Education and Training management was charged with the responsibility of preparing policy, developing procedures, establishing standards, planning and establishing priorities, and evaluating the process. Chief of Naval Education and Training management was responsible for planning activities, planning for resources, administration of personnel, and controlling the ISD process. While these responsibilities were articulated by instructions and notices, an overall plan for implementing ISD (at San Diego and Great Lakes) was not developed by CNET/CNET SUPPORT. Without an overall plan, the implementation of ISD proceeded with certain deficiencies. From a review of various documents and the operation of the IPDC, it is difficult to determine on what basis managers made decisions, what the milestones were and if they were met, and how success was measured. It appears that CNET management was reluctant to exercise strong management control after assigning the program to CNET SUPPORT. It also appears that CNET SUPPORT, after assuming responsibility for ISD, was so involved in the actual start-up and implementation of the ISD that an update to the "Blue Book" or the development of an entirely new implementation plan was not attempted.

Despite the lack of an overall current plan of action, ISD implementation was undertaken and accomplished. However, the lack of a systematic approach has resulted in the loss of the ability to compare planned objectives with actual performance. To date, no detailed long-range plan exists for the execution of the ISD process by NAVEDTRACOM.

ORGANIZATIONAL DEVELOPMENT AND IMPLEMENTATION OF ISD

The CNET decision to create an organization to manage and perform ISD, design and develop curriculums, and implement the revised NAVEDTRACOM "A" school curriculum concurrently was made prior to the issuing of Decision Memorandum No. 1 (see table 1). These decisions were, at best, extremely questionable because they failed to take into account a number of system related variables. A number of considerations associated with any new system development need to be examined before proceeding with full scale development and implementation. Resource requirements, logistics requirements, facilities requirements, political implications, training requirements, and costs of IPD system implementation and operation should have been more fully examined before starting the full scale operation. Since this was not done, it is not clear whether the organizations

SECTION II

FINDINGS AND OBSERVATIONS

This section contains an evaluation of selected features of the organizational approach taken to manage, control, and perform ISD in the NAVEDTRACOM. The features of interest were those deemed to be of greatest importance to the success of the implementation process. While the main thrust of this evaluation concerns the organizational aspect of the implementation, some discussion of ISD procedures has been included because of the critical impact of these procedures on the IPDC organization. Successive portions of this section consider the planning, organizational development and implementation, organizational structure, work process, and other functions of the IPDCs. Also included are sections evaluating the guidance and directions on the IPDCs, staffing, training and retraining, NAVEDTRA 106A, "A" School ISD analysis vs. Entire Rating Analysis, Management Information System, and a discussion of observed operational problems.

PLANNING FOR IMPLEMENTATION

Since planning is essential to the success of any organizational endeavor, this area was given initial priority for study. The planning for implementation of ISD in NAVEDTRACOM was performed by personnel at the NAVEDTRACOM and was submitted to CNET via a memorandum dated 11 August 1975. This plan was subsequently called the ISD "Blue Book." (This term for the plan will be used in the remainder of the report.) In retrospect, initial planning for the implementation of ISD was good; however, because of budget constraints the "Blue Book" plan was not fully implemented nor funded. Additionally, changes in policy; i.e., the formation and charter of the Career Training and Analysis Group (CTAG) in San Diego, caused significant deviations from the original plan in which each IPDC would have performed its own front-end analysis and would be under the direction of a Field Activity (Naval Education and Training Support Center or Naval Instructional Program Development Center).

Although the "Blue Book" as an overall plan was abandoned shortly after approval for implementation, numerous plans were developed by CNET SUPPORT and IPDC San Diego to accomplish assigned tasks of developing "A" school curriculum in accordance with NAVEDTRA 106A. Detailed plans for acquisition of personnel, programming and budgeting of funds, and schedules of work effort were developed by NETSCPAC (IPDC codes N-1, N-5, and N-8). However, the dual management of some of the organizational elements (i.e., CTAG being responsible to NETSCPAC but receiving direction and tasking from CNET), lack of in-depth knowledge of the ISD process at the command level, inability of CNET to establish course priorities, dependence upon personnel (subject matter experts (SMEs)) external to IPDC over which no control could be exercised, and lack of direction by CNET resulted in each plan omitting critical elements and/or having its effectiveness limited to a short time frame. These problems were compounded at IPDC San Diego by the iterative-process in the development of plans for both internal and external use. The initial plans for external use were developed by the Career Task Analysis Department (CTAD), formerly CTAG, and forwarded to the Instructional Program Development Department and Training Support Department for additional inputs and/or revisions and rerouted for concurrence of the entire plan prior to forwarding to upper management. Planning procedures for internal

has been widely and unjustifiably condemned and by others just as widely and unjustifiably heralded as a training panacea. Both of these viewpoints result from misinformation or a lack of information about ISD. Similar misconceptions exist as to the purpose of the NAVEDTRA 106A manual. Throughout the Navy training community the manual is criticized for failing to meet "expectations" as a detailed manual on "how to do it." The developers of the manual never intended it to function as a "by-the-numbers" manual but viewed it as a description of approved techniques and procedures for developing and conducting interservice training. Appendix A presents some observations of what ISD is and is not, thus establishing a baseline from which techniques and procedures of NAVEDTRA 106A can be evaluated.

"A" SCHOOL ISD ANALYSIS VS. ENTIRE RATING ANALYSIS

CNET policy and guidance for the establishment of the CTAG as the primary group performing front-end analysis for ISD efforts was set forth in CNET's Memorandum for the Chief of Naval Education and Training Support of 8 March 1976. Paragraphs 2 and 5 of this memorandum are quoted below in their entirety because of the impact they had on the IPDC San Diego:

"2. It has been agreed that the development of training curricula in isolation from the entire spectrum of the career ladder (occupational field) in which they naturally fall is not in the best interests of Navy training as a system, nor is it necessarily the most cost/beneficial way to approach curriculum development. It is also important to have positive methods by which training developed for one purpose is reviewed to ensure non-redundancy with training developed for another purpose. For these reasons it is agreed that there should be a strong central capability for performing front end analysis which can serve as repository of all skills required by the many occupations in the Navy and which can view the requirements for skill acquisition at any level in an occupational field from the perspective of the entire vertical career ladder of that field and horizontally among occupational fields.

"5. In accordance with the division of management functions agreed to by VADM Wilson, the CNET (Code N-5) will have responsibility for the establishment of policy, the establishment of procedures, the prescription of standards, the setting of priorities and the ultimate evaluation of the front end analysis functions. Likewise, the CNET SUPPORT will have responsibility for the planning of front end analysis activities, the planning for resources (budgeting), the administration of personnel and the control over the activities relating to front end analysis. Execution is delegated to the IPD Center."

Paragraph 2 basically established the ground work for having the CTAG perform the entire rating analysis rather than just that portion of the rating associated with the tasks performed by "A" school personnel; paragraph 5 established CNET N-5 as having management control over the CTAG.

It is readily apparent that two different functions were being carried out at the IPDC (Task Analysis Department) -- one directly related to the ISD process front-end analysis (front-end analysis of tasks E-1 through E-4) and one that was not related to the ISD process (entire rating analysis). The impact of this dual purpose on the ISD process is not quite as obvious. The purpose of the IPDC is to design/develop "A" school curriculums via the ISD process in an efficient and effective manner. The IPDCs were not established to conduct an entire rating analysis but rather were to focus on E-1 through E-4 level tasks. The number of tasks taught in an "A" school are only a small fraction of those taught for an entire rating, thus the time required for front-end analysis could be significantly reduced if all front-end analysis efforts were applied to supplying only the information required to develop "A" school curriculum.

The concept of dividing the responsibility for instructional program development between two separate organizations is counter-productive. Since IPDC San Diego was charged with the responsibility for conducting ISD, it would appear reasonable to provide that organization with centralized management and purpose. However, with CNET N-5 having primary control over CTAG policy and procedures, vis-a-vis front-end analysis, and IPDC only having control over the design and development phases of the ISD process, optimum management of available resources was not realized. It is doubtful that effective management is possible when a division in one organization is working for a manager in another organization (two echelons higher) and the two organizations have different goals.

To compound this problem, the CTAG is charged with the responsibility of providing front-end analysis for both IPDCs. A review of the communications and logistics problems that exist internally (between divisions) at the IPDC San Diego reveals that extensive liaison, communication, and coordination will be required to accomplish the goal of having one group perform the front-end analysis and provide the material for the design and development phases to another group 2,000 miles away. Similar problems will be encountered when and if other IPDCs are implemented at Memphis, Pensacola, and Norfolk.

MANAGEMENT INFORMATION SYSTEM FOR THE ISD PROGRAM

An official management information system (MIS) for controlling the CNET/ CNET SUPPORT ISD program was not established. A surrogate was instituted for IPDC San Diego in the form of a Biweekly Activity Report for internal use, a monthly Activity Situation Summary Report (SITSUM) submitted to CNET SUPPORT in accordance with CNETSUPPORTINST 1550.5 of 2 February 1978 (submitted previously in accordance with draft instruction), and a monthly Memorandum for the Record/ Distribution by CNET SUPPORT.

The Biweekly Activity Report is divided into five sections: Project Status, Accomplishments, Personnel, Problems to be Addressed by Higher Authority, and Significant Events. In addition, appended to each report is a detailed schedule depicting the planned and actual completion date plus an overall schedule of major events in accordance with the phases of NAVEDTRA 106A. The SITSUM is divided into four sections: Progress, Significant Events, Items of Interest, and General Information, which includes a problems subsection. The Memorandum for the Record contains a summary of the SITSUMs and is also divided into four sections: Progress by Rating, Personnel, Problem Areas, and Items of Significance. It is of interest to note that in July 1977 the format for Memorandum for the

Record was changed, and all future reports omitted the Problem Areas section of the report.

Although these reports provided useful information, some critical elements contained in most MISs were omitted. Key among the missing elements are cost, labor expended, and an overall schedule. The information currently provided to management via the reporting process appears to be insufficient for decisions on the expenditure of extensive resources. It is essential that a MIS for ISD be developed which will provide information upon which to base decisions of NAVEDTRA-COM concerning development of "A" school curriculum.

OPERATIONAL PROBLEMS

Among the problems identified during the course of the study were those dealing with the daily operation of the IPDCs. These are identified below.

OUTYEAR FUNDING REQUIREMENTS. Predicting the future needs for funds to procure training aids, training devices, and other support material for a course 2 to 3 years prior to course development is a difficult task. Yet in many cases, to meet the constraints of the FYDP, Resource Requirement Requests (RRRs) must be submitted 2 to 3 years in advance. For most projects undertaken by the IPDCs, this lead time exceeds the time available to ISD courses as tasked by CNET. This results in the requirement to develop two courses -- one that is supported with the aids, devices, or other material and one that does not require these items to conduct the course. A need exists to obtain "block funding" whereby those items required to support a course, but which cannot be identified until the design and development phase of the ISD process, can be procured in a timely fashion.

FACILITY ENGINEERING SUPPORT. The installation of training aids, training devices, and materials to support courses often requires construction of new facilities or modification of existing facilities. For "A" school courses it is most common to modify existing facilities to provide required space. Detailed plans of engineering quality are required for all modifications. Currently, no IPDC has an engineering capability; they must depend upon Public Works or some other agent to provide needed engineering support. In many cases the lead time required to obtain this expertise is so lengthy that delivery of the course is substantially delayed.

CONTRACTING EXPERTISE FOR THE IPDCs. The increased requirement for procuring training aids, training devices, and materials to support courses will require contracting expertise on each IPDC staff. The required expertise is to write specifications, prepare procurement documentation, and to monitor awarded contracts. The Naval Training Equipment Center (NAVTRAEQUIPCEN) has been assigned the responsibility of serving as the contracting officer for the IPDCs. In this role NAVTRAEQUIPCEN will provide the required contracting services for awarding contracts. However, once the contract is awarded it will be the function and responsibility of the IPDCs to insure contractor compliance with the specification.

MAINTENANCE SUPPORT OF COURSES. The continued maintenance of a course that has undergone the ISD process is essential for a course to succeed in its new setting. Courses that have a high percentage of changing technology must be

revised on a continuing basis. Yet, most of the schools where these courses are taught are understaffed and not equipped to provide the required maintenance of courses. Thus the task of insuring that courses include the required technological changes will be the responsibility of the IPDCs. As courses undergo ISD revision, the demand for continued maintenance of the revised courses will increase. This requirement will substantially reduce the staff available to perform the ISD process on new and existing courses.

SPONSOR/FLEET PARTICIPATION IN THE ISD PROCESS. The coordination of the requirements (i.e., selection of representative equipment, task inventories) of each project with the sponsor and fleet representative has been and continues to be a major problem. Due to the time required to ISD a rating, changes in fleet and/or sponsor personnel often occur during the program. This results in different points of view and points of emphasis being expressed throughout the entire development. Not only are these changes time consuming but require additional resources. A need exists to establish a project team concept with representatives from the fleet, sponsors, schools, and IPDCs whereby decisions that are made are based on a consensus, documented, and followed throughout the program.

VALIDATION OF INFORMATION PROVIDED BY SMEs. The use of SMEs to obtain information during the front-end analysis is essential. However, the information reflects the expertise of the particular SME and represents his view of the rating. To date, no procedure has been established to validate the information obtained from an SME. To insure an accurate data base, a procedure should be established to verify information received from an SME prior to expenditure of large amounts of resources.

NON-USE OF TRAINING PROGRAM COORDINATORS (TPCs). The IPDCs do not fully utilize the expertise and experience of the TPCs. Currently, some Program Directors and/or team leaders make extensive use of the TPCs expertise, while others do not include the TPC until later in the program or only when problems occur. To insure coordination is maintained throughout the entire ISD process and the expertise of the TPC is available to the team, requests should be made during the formulation stages of the program for the services of the TPCs and schedules developed accordingly.

SECTION III

RECOMMENDATIONS

The ability to perform the functions necessary to analyze instructional needs; design, develop, and implement instruction; and maintain quality control of the material developed, is essential to the NAVEDTRACOM mission. NAVEDTRA 106A provides a viable systems approach to training that has been adopted by CNET and should be maintained. This section presents a number of recommendations for improving the productivity/efficiency of the IPDCs. The recommendations are grouped into areas dealing with the organization for ISD, overall planning for implementation of ISD, staffing/personnel selection for IPDCs, rating analysis by the Task Analysis Department, the use of SMEs in ISD, and preanalysis and coordination for ISD.

ORGANIZATION FOR ISD

Figure 7 presents a proposed organizational scheme for future IPDCs. It is recommended that the director of each site be a military officer who has a broad operational background and knowledge of the training needs of the fleet. It is recommended that the technical director be a civilian with a broad background in training and educational technology. In light of the rotation policy for military personnel, the technical director will provide continuity to the IPDC. The proposed administration section should be responsible for the day-to-day operation of the IPDC, accomplishing such tasks as supply ordering, record keeping, providing management information, and preparation of reports. The Word Processing Center would serve as the in-house publishing center for documents from the initial draft to final publication. The Program Resource Management and Facilities staff will be responsible for plans and programs (short and long range) for the entire site. This staff will interface with CNET/CNET SUPPORT to provide accounting of resources expended and provide justification (when needed) of resources required. It also will provide engineering facility support for the IPDC as well as that required by any project team. It is anticipated that an increased use of contractor personnel will be required to support/augment the IPDCs. The proposed contracting staff will provide the expertise for each team and interface with CNET/CNET SUPPORT and the NAVTRAEQUIPCEN (who is proposed as the contracting agency for all IPDCs). The project team(s) is to be established from the pool of trained specialists. Each project team would have a minimum core group of five personnel who will follow each project assigned from front-end analysis through design and development. The team concept will insure continuity during the program. The staffing of each team varies in number (beyond the core group), as a function of complexity of course material and type of personnel required. Some of the variables that will determine team composition and size are: existing course length, technological difficulty of rating, currency of existing course, and availability of in-house expertise.

As individual specialists are required to augment the core group, they will be assigned to the project and returned to a pool upon completion. This technique will require accurate and detailed advanced planning but will be effective since the expertise of an individual can be shared among several projects over an extended period of time since all courses undertaken for ISD will not require the same length of time to complete. The number of courses that can be undertaken for revision by this proposed technique will depend upon the number of personnel at each IPDC, but the proposed method allows more courses to be underway at one

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                    ┌─────────────────┐
                    │    DIRECTOR     │
                    │   (MILITARY)    │
                    └─────────────────┘
                             │
          ┌─────────────────┐   ┌─────────────────┐
          │   TECHNICAL     │   │                 │
          │   DIRECTOR      │───│    QUALITY      │
          │   (CIVILIAN)    │   │   ASSURANCE     │
          └─────────────────┘   └─────────────────┘
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DIRECTOR
(MILITARY)

TECHNICAL
DIRECTOR
(CIVILIAN)

QUALITY
ASSURANCE

WORD
PROCESSING
CENTER

ADMINISTRATION

PROGRAM EVAL,
RESOURCE MGT,
FACILITIES

CONTRACTS

PROJECT
TEAM 1

PROJECT
TEAM 2

PROJECT
TEAM N

DESIGN/ANALYSIS/WRITERS/GRAPHICS/AUDIO-VISUAL
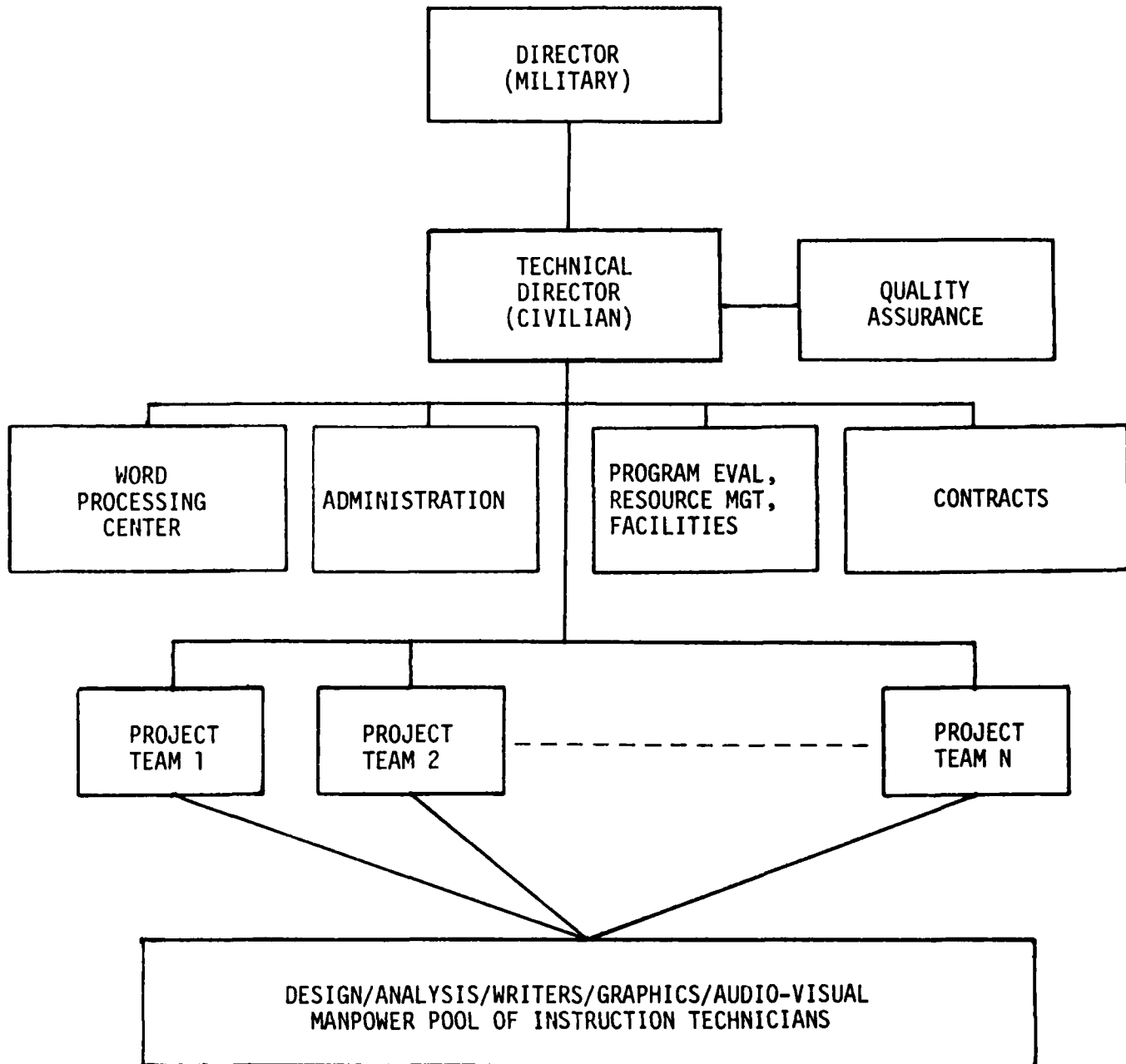MANPOWER POOL OF INSTRUCTION TECHNICIANS

Figure 7. Proposed Organization Structure for Future IPDC Sites

time than the rigid department/division structure.

This organizational structure is considered desirable in that it provides:

1. Minimum amount of supervisory personnel and maximum amount of project personnel

2. Contract support

3. The project team concept

4. The flexibility required to structure teams as workload dictates.

OVERALL PLANNING FOR IMPLEMENTATION OF ISD

A current overall plan for the implementation of ISD for NAVEDTRACOM, encompassing the elements normally included in government/military operation, does not exist. Individual units maintain their own plans; i.e., at CNET/CNET SUPPORT Resource Requirement Requests are submitted to Chief of Naval Operations to obtain funds. The IPDCs maintain plans for individual course revision. Yet, plans for all the various organizations are not coordinated. A need exists for the development of an overall plan for NAVEDTRACOM implementation management of ISD. The existing plans of the local IPDCs should be used as the baseline for the ISD program. However, these plans must be revised and expanded to include the overall ISD program for the immediate future as well as the long range goal. Because plans are notorious for change, a means should be established to continuously update the overall as well as the detailed plan. To insure compliance with the plans, representatives from the sponsor, fleet, schools, and IPDCs should be encouraged to attend planning sessions and contribute to the development of the overall plan. The completed overall plan should be updated periodically and widely distributed.

Developing and maintaining an overall plan will provide management a tool for assessing the timeliness of milestones, timeliness of resources (Acquisition and Expenditure), and a yardstick to measure success or failure of the ISD program. A well developed plan that is implemented accordingly will insure creditability of NAVEDTRACOM efforts to implement the ISD program.

GUIDANCE AND DIRECTION FOR THE IPDCs

The experience gained during the past 2 years gives the IPDCs an excellent background to manage their own affairs. It is recommended that more site autonomy be given in future instructions, notices, or directives. Not only will this relieve higher headquarters of many management burdens but will cause decisions to be made at the lowest possible level, increase morale, and probably increase efficiency since no time delay will be imposed waiting for "someone else to make the decision." It is recommended that a review be conducted of all the guidance and directions given to the IPDCs since the inception of the implementation. This review should include instructions, directives, and notices as well as memorandums for the record, telephone and verbal directions. The purpose of this review would be to reduce "official" documentation to a minimum, ensuring each IPDC the autonomy and flexibility needed to perform the custom project work

required without becoming bogged down in "by the numbers" attempts to proceduralize the ISD process.

STAFFING/PERSONNEL SELECTION FOR THE IPDCs

The task of selecting the right person for the right job is formidable. Staffing the IPDC should be predicated on obtaining personnel with the desired skills and/or experience. If experienced personnel are not available, personnel with the appropriate or compatible background should be selected and trained. It is recommended that in addition to education technology courses, these personnel should have courses in personnel management, industrial psychology, human learning, test construction and measurement, and basic statistics. Many undergraduate psychology and industrial engineering majors have some of these skills in their professional background and would be excellent candidates for IPDC employment.

The core project team composition is critical if the team is to be efficient and effective. Table 2 contains the recommended general schedule series composition and the number of recommended personnel.

TABLE 2. PROJECT TEAM COMPOSITION

```
+--------------------------------------------------+
| No.                                              |
| Recommended          GS Series                   |
| ─────────            ─────────                    |
|                                                  |
|              ┌─────ED SPEC (1710) Team Leader    |
|      1◄──────┤                                   |
|              └────►PSYCH (180)                   |
|                                                  |
|              ┌─────ED TECH (1702)                |
|      2◄──────┤                                   |
|              └────TNG SPEC (1712)                |
|                                                  |
|      2             ED SPEC (1710)                |
|                                                  |
|              ┌────WRITER (1082)                  |
|      1◄──────┤                                   |
|              └────WRITER (1083)                  |
|                                                  |
|                 SMEs as required                 |
|                                                  |
+--------------------------------------------------+
```

This mix will provide the team with the skills necessary to accomplish their mission. It should be noted that the project team leader is considered to perform not only the team's management functions but also functions as a worker.

RATING ANALYSIS BY THE TASK ANALYSIS DEPARTMENT

Presently, the most time consuming portion of the ISD process at the IPDCs is the analysis phase. It is time consuming because the procedures as set forth by CNET require that a Job Task Inventory of the entire rating be performed, rather than that portion of the rating for which "A" school curriculum is being developed. This is being done at the expense of the ISD program, and if continued will probably be a major obstacle to the successful implementation of ISD in NAVEDTRACOM. It is recommended that:

- The front-end analysis group should analyze only those job related tasks that are directly applicable to the "A" school curriculum utilizing the guidance of NAVEDTRA 106A.

- The project team should become knowledgeable in subject matter prior to interacting with SMEs. Knowledge can be obtained by utilizing NOTAP, PQS, PMS, rate training manuals, and technical publications to identify the tasks that should be performed. In some instances, team members should attend the existing "A" school courses.

- Minimum demand should be placed on the SMEs to analyze material and develop task listings. They have, in general, limited background or training in these areas. The SMEs should be treated primarily as an information resource to verify the work done by the project team members prior to the SMEs arrival at the IPDCs.

THE USE OF SMEs in ISD

The availability of SMEs for performing various functions throughout the entire ISD process is critical. Without SME support the Navy will not realize the maximum potential from ISD. Adequate SME support is not, was not, and will not be available under existing circumstances. Consequently, it is necessary to initiate alternative strategies for developing personnel that can give the desired/required support. Listed below are a number of alternatives that could alleviate the problem.

- Internal Specialist: send selected personnel to the relevant schools to obtain first-hand experience in the rating.

- Contract: contract with private industry for the needed skills.

- Temporary (700 HR) Hire: advertise as required, inside or outside the Navy community, for people with the necessary backgrounds and bring them into the team for the duration of the project.

- Plowback Graduate Students: if possible, and with the agreement of the school, a recent graduate of the course could be utilized to substitute for an instructor during less critical classroom periods. This would make an instructor (SME) available, for limited periods, to provide assistance to the front-end analysis group.

- Direct Detailing: direct detailing of SMEs from fleet or shore billets to the IPDCs for duty would be optimum. This would allow the SMEs to devote full time effort.

PREANALYSIS AND COORDINATION FOR ISD

The lack of an established preanalysis phase (i.e., 6 to 9 month period prior to convening the formal analysis phase) has and will continue to have a significant impact on the execution of the entire ISD process. It is desirable that the core project team group be identified and structured 6 to 9 months prior to the planned starting date of the analysis phase. It is during this

period that the essential organizational interface with the sponsor, fleet, school, and other CNET functional commands must be established to prevent future misunderstandings and/or misconceptions concerning the approach that will be taken in applying ISD to the selected rating's "A" school. Appropriate guidelines have been issued that could be used for conducting the preanalysis phase, but they are fragmented and appear in several documents (i.e., IPD project checklist, NAVEDTRA 106A Supplement 2).

If one organization is tasked with providing a service that spans the boundaries of other organizations, proper coordination is essential if the organization is to successfully accomplish its mission. Coordination efforts should begin prior to initiation of the project to ensure all involved parties (TPC, school, fleet, sponsor, CNET, CNET SUPPORT, CNTECHTRA, Service School Command (SSC)) know, understand, and agree on the end products. Coordinated activities should address the following areas:

- SME acquisition

- Acceptance of training objective

- Facilities and long lead time item planning

- Course implementation management planning.

SECTION IV

POSTNOTE

ACHIEVEMENTS IN THE IMPLEMENTATION OF ISD

The concepts and processes underlying ISD are not new, having been developed soon after World War II and refined in the interim between then and now. Many approaches have been applied with various degrees of success. The concept has been applied in the private sector as well as in various government contexts. In theory, it is an ideal way to develop a course. It would seem that after such an extensive history full agreement on ISD could be reached. Unfortunately, this is not the case. The major problem is believed to be a misunderstanding on the part of the sponsors, schools, and fleet of the NAVEDTRA 106A ISD process (its strengths and weaknesses).

Many of the problems encountered in the establishment of the IPDCs have been overcome. Yet problems of overall planning, personnel, availability of SMEs, lead time to procure aids and devices to support courses, imposed time constraints, and availability of resources still exist. Specific action must be taken to alleviate these problems if the benefits of the ISD concept are to be realized.

In retrospect some significant achievements have been made at the IPDC in San Diego and Great Lakes. The IPDC San Diego was established with only two trained personnel (quasi-trained by attending a 4-week course at Florida State University) in the ISD methodology. Beginning in the spring of 1976, these persons, augmented by a limited number of Florida State University personnel that made aperiodic visits to San Diego, conducted in-house training of personnel that would be assigned to the IPDC. The establishment of IPDC San Diego in July 1976 was accomplished with internal NAVEDTRACOM resources by reassigning personnel within NETSCPAC, reassignment of CNTECHTRA personnel to IPDC, disestablishment of ILDG and reassignment of personnel to IPDC, and hiring a limited number of personnel from other sources. The IPDC was immediately charged with the responsibility of producing course material for the RM rating within a very short time frame. Thus the IPDC San Diego was required to be productive and, at the same time, train their personnel in the procedural concepts of NAVEDTRA 106A.

In addition, the implementation of ISD by the IPDCs was hampered by an ineffective organizational structure, the insistence on a complete rating analysis, the unavailability of SMEs, the uncertainty of the school/sponsor/ fleet of the type course that would be developed, utilizing a new method for course curriculum development, the deadline of 12 months for course completion, lack of direction from the highest levels, and a multitude of minor problems. With these formidable problems, it is truly amazing that a course at the RM-A school of such professional quality was developed.

Approximately 175 hours per hour of instruction were expended developing the RM-A school curriculum. Critics point to this as being excessively high. What is not recognized is that there is no baseline for a comparative analysis with the previous method of developing curriculum in each school. (Discussion with RAND personnel revealed that no baseline exists external to the Navy.) While IPDC personnel did develop initial courses under a number of adversities

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those experiences have placed it in an excellent position to increase productivity and pay a return on the investment that has been made. In addition, the economies of scale that have been and are being realized in the ISD process under centralized management cannot possibly be achieved with personnel at individual schools revising/creating curriculum in accordance with the principles of ISD.

Within 18 months IPDC San Diego had completed a complete task analysis of the entire RM rating, had designed and developed over 300 hours of instruction, and had run a pilot test course to obtain feedback on the suitability of this initial course for the RM-A school. In addition to the RM-A course, a front-end analysis for the electronic technician, hull maintenance technician, interior communication electrician, and data systems technician was undertaken. Further, the design and development of the interior communication electrician course has been accomplished in accordance with NAVEDTRA 106A.

In the first year of operation the IPDC Great Lakes completed its first major assignment. This assignment consisted of designing and developing a curriculum for the fireman apprentice (FA) course. The analysis phase for the FA was minimal. Problems were encountered, as with any new organization, but profiting from the experience of IPDC San Diego, the course was developed and "on-line" ahead of schedule. In addition to developing course curriculum for the FA, IPDC Great Lakes currently is designing and developing curriculum for the ET and EM ratings.

Despite the difficulties associated with the implementation of centralized management of ISD in the NAVEDTRACOM, it is clear that this approach offers a viable alternative to traditional course development. To obtain all the potential benefits inherent in the methodology, those problems emanating from organizational and decision making deficiencies must be overcome. This study provides recommendations for the correction of some of these deficiencies.

CONTINUING CHANGES

The initial analysis associated with this study was conducted during the period June to October 1978. During this time period, briefings were given and discussions were held with decision makers at NETSCPAC, CNET SUPPORT, and CNET on the implementation problems encountered. During the conduct of the study many changes took place in personnel, organizational structure, physical location of IPDC San Diego personnel, front-end analysis procedures, and changes to instructions, directives, and notices.

The major change in personnel consisted of changes in professional staff members at IPDC San Diego and Great Lakes, a new commanding officer at NETSCPAC, and a new Director for the ISD Program Development at CNET SUPPORT. Changes were made to the organizational structure at both IPDC San Diego and CNET SUPPORT. The new organizational structure at IPDC San Diego is presented in figure 8. Organizational changes at CNET SUPPORT consisted of establishing separate points of contact for each IPDC and realignment of planning, evaluation, and program monitoring procedures. To provide more effective management control, the majority of personnel at IPDC San Diego were relocated in one building at the Naval Training Center, San Diego. The directive requiring complete rating analysis has been revised by CNET and only the Job Task Inventory (JTI) for rates E-1 through E-4
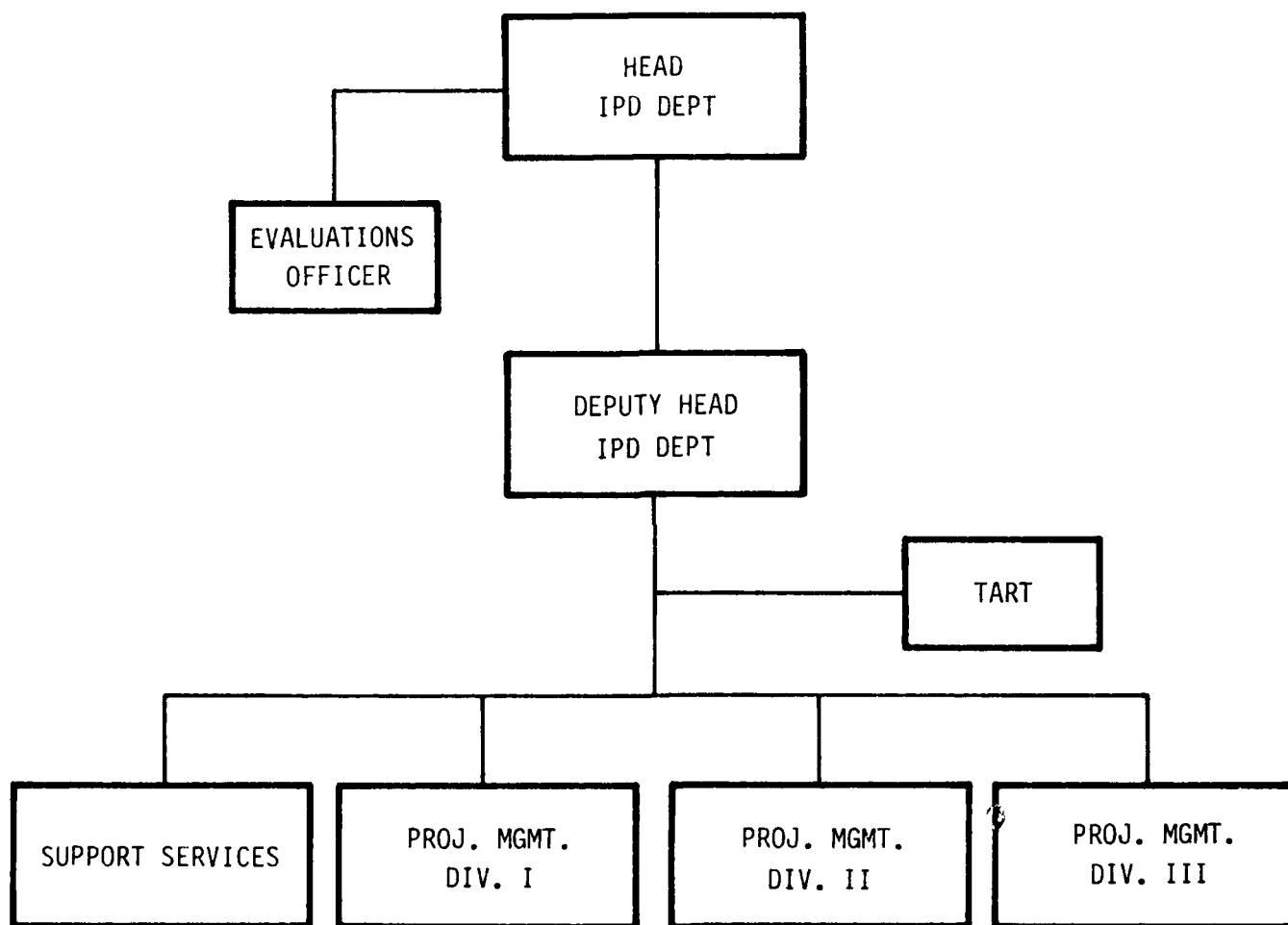
Figure 8.   Revised IPDC San Diego Organization Structure

is required. Official recognition of these changes has been made by issuing revisions to existing instructions and directives.

To determine the impact of the above and other changes, a visit was made to IPDC San Diego in February 1979. Interviews were held with staff and management personnel. The observations resulting from the visit are given below:

- Staff members have gained experience and competency in applying ISD methodology to Navy "A" school curriculum.

- Front-end analysis of an entire rating is not required. Analysis of tasks performed by rates E1 through E4 is being accomplished in a more efficient, relevant manner.

- Front-end analysis is being conducted by each site (i.e., Great Lakes and San Diego).

- Project leaders have more autonomy in executing their programs on a day-to-day basis. Authority commensurate with responsibility has been given under the new organization.

- Less interference with project activities from outside sources (CNET/ CNET SUPPORT) is being experienced.

- Physical relocation of the majority of IPDC personnel to one building is beneficial for many reasons; i.e., communications, administration, esprit-de-corps, and management.

- Productivity has increased.

- Morale has increased among workers.

- Cooperation from schools has improved greatly.

- Better use is being made of SMEs available time.

- There has been a decrease in the number of major problems that must be addressed. Problems encountered most often are operational problems.

Notwithstanding the salutary observations cited above, a number of problems continue to plague the IPDC San Diego operation. Some of these problems are difficult to solve and will defy short-term solutions; others are easier to correct. Problems worthy of immediate consideration are listed below.

- Some personnel (i.e., N-5 personnel/illustrators) filling ISD billets are not located at the IPDC San Diego. Consequently they are not perceived as part of the organization.

- Some staff members are resisting the multidisciplinary approach. They would rather maintain their present status than to acquire new skills.

- The TART program needs to be expanded to provide continued training for all staff members.

- Some staff members are inappropriately assigned. Individual expertise should be better utilized on any and all projects.

- Interdepartmental communication needs improving.

- There is a lack of interdepartmental personnel transfer flexibility.

- A facilities engineer is needed.

- A technique for long-term support of equipment/devices associated with courses is not defined.

- The internal quality control functions have not advanced beyond the stage of lip service. The IPDC management has not explored enough ways to define and exercise the quality control function.

- Contract resources have not been utilized to enhance the productivity of the organization.

- Project preplanning (although significantly improved) should be formalized through the chain-of-command (NAVEDTRACOM).

- No long-term plan (analogous to the FYDP) for future activity has been developed.

- Resources required for course maintenance need to be addressed.

- Authority for direct liaison with the CNO sponsor and the fleet is still needed.

- A new OPNAV instruction is needed to insure coordination between IPDC and the fleet.

- Project Managers need to have more direct control over which personnel are assigned to them.

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APPENDIX A

SELECTED DISCUSSIONS ABOUT ISD

SELECTED DISCUSSIONS ABOUT ISD

WHAT IS ISD?

Considerable confusion exists as to what ISD is and what it is not. Because of this confusion unrealistic expectations may arise. In an attempt to clarify this situation several cogent examples of what is not ISD are presented. (The list is not exhaustive.)

ISD IS NOT:

- the PPBS (for training facilities, billets, and logistic support)

- the personnel who perform ISD

- the administration and management of the ISD function

- the training of personnel

- an instructional program

- an Instructional Program Development Center (IPDC)

- a cost accounting system

- a remedy for poor job design

- a remedy for personnel assignment/misassignment

- the determination of just one way to meet training objectives

- synonymous with self-paced instruction

- reducible to "cookbook" or "by-the-numbers" procedures to be followed (blindly by unsophisticated personnel).

WHAT ISD IS. Much has been written on ISD by many contributors over the years. Essential aspects of the ISD process selected from several representative sources are summarized below.

Conspicuous aspects for the systems approach (Banathy, 1968):

1. An insistence upon a clear definition of the purpose of the system, and upon the formulation of performance expectations stated specifically enough to enable the construction of criterion measures that will reveal evidence of the degree to which expected performance has been attained.

2. The examination of the characteristics of the input.

3. The consideration of alternatives and the identification of what has to be done and how, by whom or by what, when and where, so as to ensure that the predetermined performance will be attained.

4. The implementation of the system and the testing of its output for the purposes of measuring the degree to which performance expectations are being met and assessing the efficiency of systems operations.

5. The identification and implementation of any adjustments needed in order to ensure the attainment of the purpose and optimize system output and system economy.

Transforming these major system strategies into the domain of education will require us to:

1. Formulate specific learning objectives, clearly stating whatever the learner is expected to be able to do, know, and feel as an outcome of his learning experiences.

2. Develop tests to measure the degree to which the learner has attained the objectives.

3. Examine the input characteristics and capabilities of the learners.

4. Identify whatever has to be learned so that the learner will be able to perform as expected.

5. Consider alternatives from which to select learning content, learning experiences, components, and resources needed to achieve the stated objectives.

6. Install the system and collect information from the findings of performance testing and systems evaluation.

7. Regulate the system. The feedback from testing and evaluation will serve as a basis upon which the system will be changed--by design--in order to ensure ever-improving learning achievement and optimum systems economy.

A description of ISD emphasizing process rather than product centers on the following (Boutwell, 1978):

Generic Components of ISD

There are a variety of ISD models currently in use in military, industrial, and academic settings which vary widely in terms of the component procedures. The designer's level of expertise, desire to proceduralize development steps, and cost-effectiveness are the main reasons for such diversification. Most of these models can be reduced to five functional phases: needs analysis, design, development, implementation, and evaluation. Unfortunately, the operational definition differs in content and procedures across

models. The activities included in each of these phases
will be briefly described in order that a common referent
can be established.

Needs Analysis. This activity is usually done within the
organization and consists of (a) mission analysis or job
analysis; i.e., assigning tasks to job descriptions and
(b) training analysis; i.e., determining manpower,
facilities and equipment requirements to maintain the
training setting. It usually includes administrative
and policy constraints. The output of this first phase
is a statement of final product characteristics (job
description) and an outline of how the training program
will be implemented; i.e., managerial flow.

Design. The design phase of ISD consists of five major
activities: media selection, course organization, lesson
specification, evaluative feedback sequencing, and imple-
mentation strategies. Each of these phases requires
expert decisions necessitating a varied set of skills
and experience. This phase also requires a certain
amount of creativity in that the design decisions must
adapt the ISD concepts rather than adopt the ISD pro-
cedures. As will be discussed later, training environ-
ments are usually unique; i.e., environmental conditions
and personal backgrounds are dissimilar, which requires
modification in the ISD design approach.

Development. The developmental phase of ISD consists of
three major activities: scriptwriting, formative tryout,
and production. There are many sub-skills required in
this third phase. This paper is not intended to expand
on those, suffice to say that the major decisions
required to carry out successful development are made
in the design stage. Lesson specification and procedural
requirements insuring quality control are usually defined
in operational terms with measurable performance
criteria at each step; e.g., format, slide production,
one-on-one data collection, etc.

Implementation. Implementation of a newly developed or
revised instructional program has two requirements:
(a) providing training for instructors and instructional
managers and (b) conducting the actual instruction on
students. Implementation serves as a link between the
development and evaluation phases, in that, besides
carrying out the basic training objectives of the
program (to train students to apply knowledge), it also
serves as the quality control laboratory for the program,
providing the data required for assessing the program
effectiveness.

Evaluation. The evaluation phase is a broadbased, con-
tinuing activity which fine tunes each of the four
previous phases. It is an ongoing, cyclic activity
which measures and evaluates the output of each ISD
activity. There are feedback cycles for feedback cycles,
all directed to the summative issues of (a) is the pro-
gram or component meeting its stated goal; (b) are the
implementation strategies practical and (c) are the
students meeting the competence needs of the real world.

These five generic phases of ISD have become buzz words
of instructional technology and oftentimes have idiosyn-
cratic interpretations which may be dysfunctional to
other designers. The phases are components of material
development flowcharts which act as procedural guide-
posts, but rarely reach the point of specificity
whereby they help the designer make student prescriptive
decisions. Student prescriptive decisions are those
where the designer combines creativity, intuition, and
past experience to juxtapose the principles of learning
(arousal theory, reinforcement theory) to levels of
learning (cognitive, affective, psychomotor) for a
specific target population (age, IQ, demographic
background) with environmental training setting (large
class, shipboard, field conditions). The greater the
creativity of the course designer in generating train-
ing strategies the more likely the resulting course
will be successful. ISD technology can be used to
critically examine those ideas but rarely to generate
them.

NONQUANTIFIABLE BENEFITS OF ISD. When costs exceed quantifiable estimates of
benefits, the nonquantifiable benefits may be sufficient to justify the acceptance
of alternatives by policy and decision makers.

The benefits of ISD include the following (Presearch, 1976):

ISD:

- Links learning objectives, instructional material, and criterion
  measurement in an integrative manner.

- Facilitates more rapid learning.

- Identifies and eliminates nonrelevant material from existing
  training.

- Identifies and causes to be produced the instruction necessary
  for job task performance which may have been overlooked in
  existing curricula.

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● Permits more cogent determination of where learning objectives can be met; i.e., in the schoolhouse or the shipboard environment, thus providing for more economic attainment of training objectives.

● Lends itself to modularity in terms of learning objectives definition and instructional packaging thereby achieving a reduction in course duplication and facilitating course development through the use of previously prepared instructional modules.

● Has reduced student average on board (AOB) in most documented instances. It has reduced instructor requirements for the U.S. Air Force.

The above benefits derive from adopting the ISD approach. Other benefits to the Navy accrue from the way in which ISD is implemented and institutionalized to become standard operating procedures. ISD may yield further benefits such as:

1. Greater efficiency in the production of training material; e.g., personnel dedicated to course development who do not have to time-share with teaching, administration, and generally "getting up to speed."

2. A higher concentration and focusing of instructional expertise in strategic sites serving schoolhouses will permit more time to be devoted exclusively to instructing students by the various schools.

3. The institutionalization of quality control, inherent in the ISD process, will assure uniformity of instructional content and performance standards regardless of the site of instruction. Graduates of courses may be certified vis-a-vis accomplishing specific learning objectives. Finally, accountability for the quality of instructional outputs is realizable (for the first time in the Navy) via the closed loop of fleet performance indicators being fed back to the ISD process.

4. Another ISD benefit which will require more time to discuss than available for this study concerns the potential for the tying together of billet descriptions, training requirements, and personnel advancement through the interface of training and personnel management.

Not everything about ISD is a benefit; however, most of the disadvantages are best subsumed under the heading "cost to implement." It can be said that the ISD process will yield the assumed benefits only if the right personnel resources and management policies are chosen for the implementation and development. Future appraisals and possible redirections of the ISD process are inevitable and necessary. As the development matures, it can become more effective and these nonquantifiable benefits will become more firmly assessable and their impact appreciated.

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